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The American Industry Project was initiated to develop and field test a secondary school curriculum which had as its central purpose the study of industry. An evaluation system was adopted to provide data for curriculum design dxecisions and to measure program effects. Three courses were developed to introduce and provide experience in utilizing industrial concepts, involve students in the flow of activities and events in industry, and provide for individual study and problem solving experience. The evaluation domains of ingredients, processes, and products were identified. Major findings related to student outcomes were: (1) 36-week courses produced more significant results than shorter courses. (2) Response patterns on attitude measures favored the American Industry students when significant differences were obtained. (3) Attitudes toward industry and occupational behaviors were influenced most strongly. (4) The study of American Industry increased student perspectives of jobs available and their interest in seeking employment in one of them, and (5) 75 percent of the students in both the control and American Industry group were aware of the changing nature of jobs in industry. (DM)

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THE EVALUATION SYSTEM FOR THE AMERICAN INDUSTRY SECONDARY SCHOOL COURSES

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For

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THE EVALUATION SYSTEM FOR THE AMERICAN INDUSTRY SECONDARY SCHOOOL COURSES

Introduction

Throughout the last three years the American Industry Project has been developing and field testing a secondary school curriculum which has as its central purpose the study of industry. An evaluation system was designed and refined in concert with the curriculum development activities to provide data for the various curriculum design decisions and to measure the effects of the study of American Industry. This evaluation system is described in later sections of this paper. The following section gives a brief overview of the American Industry rationale for those who have not been exposed to it before. If the reader has already heard or read this material, he may desire to page directly to the section entitled "Evaluation of American Industry Courses." This section gives the rationale for the evaluation system developed for the Project and outlines the types of data collected. The concluding part of this paper presents several studies based on selected portions of the information gathered.

Rationale for the Study of American Industry

During the 1962-63 school year, several professors at Stout State University initiated a series of meetings to discuss their concerns related to the content and scope of the existing industrial arts curriculum. Out of these discussions grew the rationale for the study of American Industry. Embodied in this rationale were four basic tenets related to the source and nature of content to be studied.

The first tenet identified Industry as the source of content. Industry was subsequently defined as "an institution in our society which, intending to make a monetary profit, applies knowledge and utilizes natural and human resources to produce goods or services to meet the needs of man." Obviously this definition encompasses a wide variety of business enterprises. To study each one would be impossible. However, the discussion group noted a number of similarities among all enterprises. For example, merchants, automotive dealers, manufacturers, contractors, service station owners, and farmers have to apply management techniques in their businesses.

The trend to the study of concepts in other curriculum areas reinforced the conclusion that a diverse set of enterprises could be reduced to a set of meaningful concepts. In addition, Bruner's work (1960) indicated that a discipline has an underlying structure which interrelates the basic ideas found in the discipline and lends considerable explanatory power to its postulates, concepts, and principles. On this basis, the decision was made to analyze a variety of industries,[1] to isolate the concepts common to them, and to identify the relationships among the concepts. After considerable

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[1]When used in this manner, industry refers to a group of enterprises or businesses engaged in producing or servicing the same type of product such as the auto industry or the TV repair industry. American Industry refers to the institution identified in the Project's definition of Industry and includes all industries that exist to make a monetary profit.

study, several hundred contacts with industry and labor leaders, and considerable discussion on the part of the American Industry staff, the concepts and structure depicted in Figure 1 were delineated. The concepts on the inner ball are the ones Industry uses directly to accomplish its goals. The concepts listed in the outer ring identify the environment in which Industry operates. An interaction relationship exists between the concepts on the ball and those in the ring.

Tenets two and three of the four mentioned previously are related to this structure: (2) the study of American Industry will be concerned with the structure of the knowledges of Industry, and (3) this study will also concentrate on the concepts of Industry. The remaining tenet stresses the inclusion of problem solving experiences in the American Industry curriculum.[2]

Three secondary school courses have been designed on the basis of this rationale and the structure. The first course, Level I, introduces the student to the basic concepts of industry listed in Figure 1 and gives him experience using these concepts to solve industrial problems. In the second course, Level II, the student goes into greater depth in each of the concept areas and becomes more involved with the actual flow of activities and events in an industry. At this level, he also encounters more sophisticated industrial problems. Level III provides the student an opportunity for individual study and an in-depth problem solving experience. He is encouraged to select a suitable problem and investigate it in terms of the conceptual structure of industry.

All three levels are viewed as transitional subjects between general and vocational education. Their goal is to provide experiences that assist the individual to make wise vocational choices, to understand his chosen role in our complex industrial society, and to be a productive member of society. Only the first level is viewed as a required course. After this point a student may decide to continue in the American Industry sequence or elect to take any of the other programs available in his school.

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[2]A more detailed description of the American Industry Project's rationale may be found in 'The Establishment of American Industry as a Transitional Subject Between General and Vocational Education" authored by Wesley Face and Eugene Flug, Co-Directors of the American Industry Project.

Figure 1

A CONCEPTUAL STRUCTURE
OF THE KNOWLEDGES NECESSARY
TO UNDERSTAND AMERICAN INDUSTRY

672 C

Evaluation of the American Industry Courses

Purposes of the Evaluation

Will students have significantly different competencies after studying this course? Can eighth grade students read this material? Should this lesson contain more detail? Why was this activity successful while the first one failed? These and similar questions challenge curriculum developers and evaluators. And, the American Industry Project was not unique in this respect in that it had to answer the same questions.

The first question may be answered by measures of terminal behaviors in experimental, quasi-experimental, or time-series experimental studies. However, the other questions listed require additional information. Most of this information is related to the inputs into the instructional setting and the teaching-learning activities that transpire in this same setting. In many ways this information is analogous to the data required to make scientific management decisions.

As the Project began the research specialist identified several questions germane to the evaluation. Most of these were associated with the outcomes of the study of American Industry such as the ability to think conceptually and solve problems. However, after the data for the first term had been analyzed, a mixture of positive and negative results caused a further examination of the scope of the evaluation. Additional questions which emphasized the gathering of data pertaining to the factors that influenced the terminal behaviors of students were defined. Then the evaluation system was revised to provide the means to collect the information required to answer these questions. Not only did these additional data assist in illuminating the critical factors related to the end results but they helped to identify problems in time to take corrective action prior to the end of the school term.

The complete evaluation system presently employed by the Project is described in the next section. Remember that it was developed to assess the outcomes of the study of a new curriculum and to provide management information to the Project staff. Each instrument and data gathering device was selected and designed to provide the information required for decision making and answering the critical questions associated with the development and teaching of these courses.

It is impossible to overemphasize the importance of distilling the critical questions and identifying the essential decisions as the basis for the design of an evaluation system. Even if it proves difficult to obtain information for some of them, this very fact will stimulate the researcher to further development and encourage creative ways to garner the needed data.

Evaluation Domains and Procedures

Early in the design of the evaluation system three domains were defined in which to collect data. The ingredients domain encompasses all of the inputs into the learning situation. Examples of these inputs are the quality of the instructional materials, abilities and interests of the students, characteristics of the participating teachers, and the intellectual climate of the school and the community.

As a course is being taught, a number of instructional processes are applied to and interact with these inputs. Students are exposed to instructional media, activity sheets, and booklets in the American Industry course. Teachers are exposed to new materials and ideas and their associates become aware of a new curriculum. All of these on-going actions and activities are embraced in the processes domain. This domain can generate a continuous flow of vital information during the time the course is in progress. However, it requires systematic monitoring and a relatively rapid feedback process.

The third domain consists of the products or outcomes of the study of American Industry. It is concerned with the nature of the student at the end of the course, impressions of the teachers, reactions by administrators and staff members at the school, and opinions of the parents.

Figure 2 gives a graphic presentation of these domains and illustrates the relationship between them. Examples of data collection procedures and instruments for each domain are presented in the next section.

The evaluation domains identify the sources of information in the evaluation. Equally important are the types of data collected and the collection schedule. Figure 3 depicts the strategy utilized in developing and evaluating learning expedients. The ball at the left symbolizes the basic role the Project's rationale plays in each action and decision. Initial tryouts of materials, learning activities, or instructional methods probably will not provide optimum solutions; however, they will provide feedback for further refinements. These results and relationships are indicated by the spiral line around the solution axis and the decreasing distance between the two with each succeeding spiral. This strategy may be applied to an entire course, a unit in the course, or a sub-part of the unit. Its application will depend on the data required by the researcher.

The relationships of the linear distance traversed along the solution axis during each succeeding spiral is denoted by $X>Y>Z$ in Figure 3. In other words, progress becomes more difficult with each successive spiral. The first trial identifies obvious areas in which improvements can be made. As these changes are made, smaller and more subtle problems come to the forefront.

EVALUATION DOMAINS IN THE AMERICAN INDUSTRY PROJECT

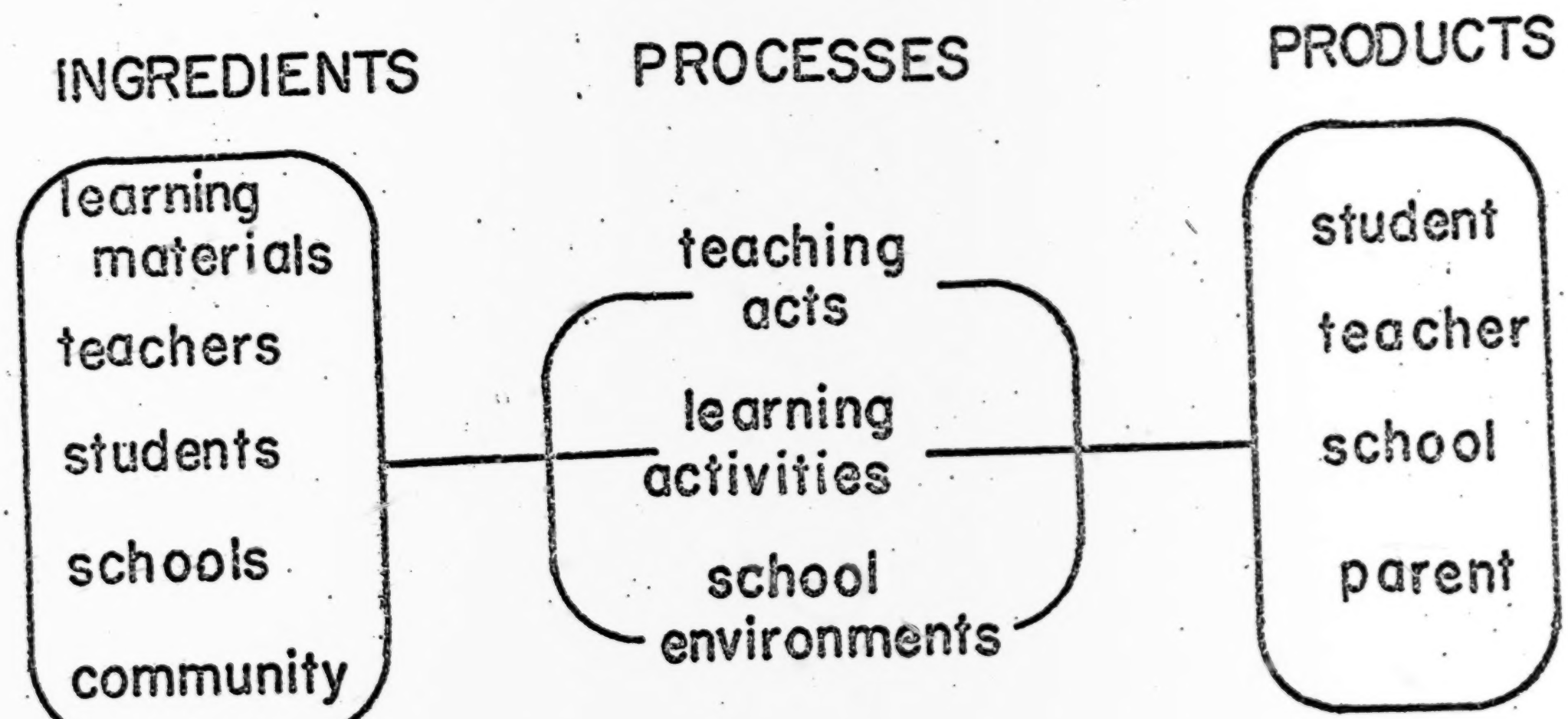

Figure 2

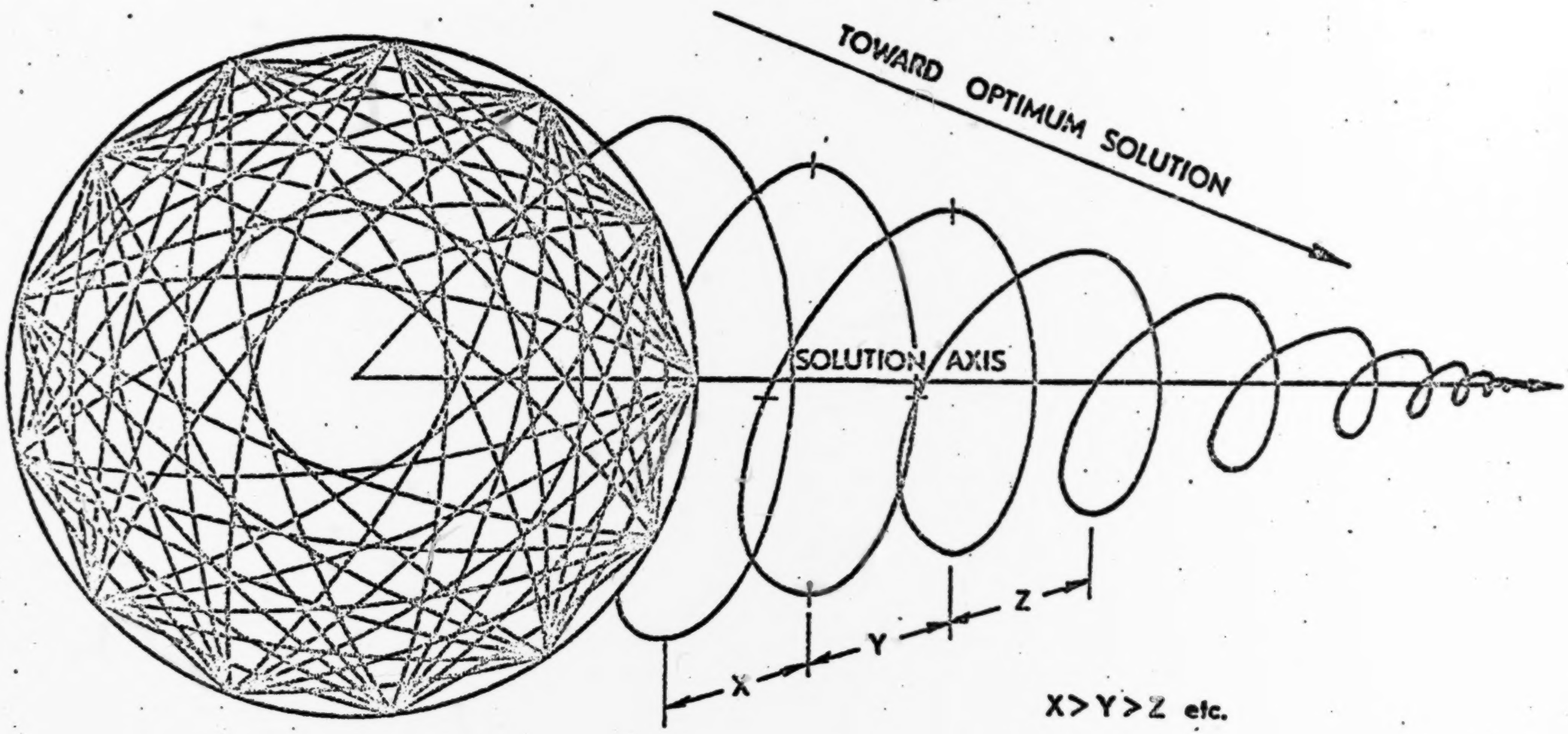

Figure 3

Research and Development Strategy[3]

[3]The Research Specialist is indebted to Dr. Martin I. Taft of the Department of Mechanical Engineering at UCLA for the idea for this graphic representation of the Project's research and development strategy.

Each spiral along the solution axis contains five distinct segments that represent specific steps in the development and evaluation of a curriculum or a sub-part of it. The first step is to state the objectives for the course or segment of instruction in as lucid terms as possible. Once the objectives are stated learning expedients can be selected or developed to meet them. At this point the learning expedients are ready for a tryout in an instructional situation. This may be in a regular classroom or a special group of students may be selected on which to run the first trials. Data are collected prior to, during, and at the end of the tryout to provide the basis for the evaluation. The domains noted previously identify areas in which to collect information. Interpretation of the products data is made in relation to the ingredients and processes data as well as in comparison with the performance of the control group. A graphic illustration of a specific spiral is given in Figure 4. The ring which envelopes the spiral connotes the role of the ingredients and processes data in evaluating the outcomes of the test of the learning expedients.

Upon completion of the evaluation, the researcher must decide whether the objectives were met and if not, the reason(s) for not attaining them. If the decision is made to continue into another cycle, the same five steps would be employed. This process would be continued until a satisfactory level of achievement is reached. "Satisfactory" as used in this context does not imply that the instructional materials are perfect, rather, it means that in relation to the other elements of instruction being developed the one under consideration has been improved to the point where it would be more efficient to work with another one.

To the degree time and resources permit, a variety of measurements should be made during each evaluation. Each type of measurement has its biases. Use of several will hopefully isolate the factual information from the random error and bias factors present in specific types of measurement. For instance, objective tests allow the evaluator to sample a prescribed set of behaviors but they penalize the nonverbal student. Whereas essay tests allow the student to freely express himself, they suffer from the lack of scope in the behaviors sampled and the objectivity of the scoring process. Observation of students in the "normal" classroom setting and engaging them in discussion can also help to assess their competencies, but this procedure in itself alters the "normal" classroom situation and is open to rater bias. However, use of the data from all three sources in the analysis can help to identify the true outcomes.

When using this approach care must be taken to avoid overloading any one person with evaluation forms. Students could be inundated with tests and rating sheets. Since there are a variety of sources of information, this situation usually can be avoided by some careful planning. The American Industry Project, for example, obtains information from the participating teachers, students, guidance counselors, administrators, the Project's supervisor of participating teachers, and the instructional materials. Where possible, simple forms are designed to facilitate responding and direct duplication of data is avoided with the exception of some collected to use in determining the reliability of the measuring techniques.

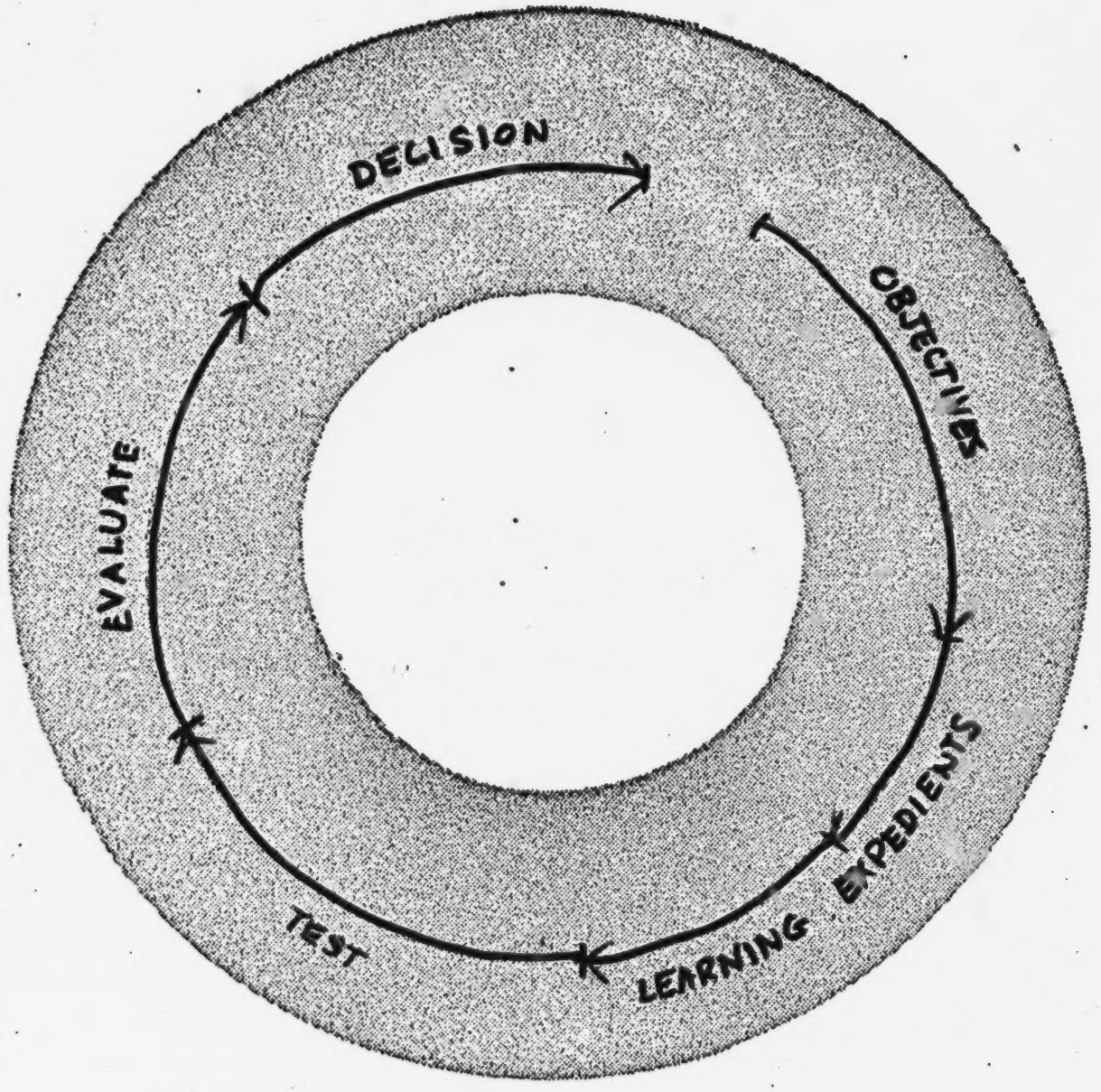

Figure 4

A Specific Research and Development Spiral

The following are some examples of the data contributed to the Project and their source. Individual lessons and other instructional materials are rated by the participating teacher. Rating sheets are placed after each lesson in the instructor's guides and accompany the instructional media. These forms require two to three minutes to complete and provide useful information on the structure, contents, and utility of the material rated. Also, the placement of the rating sheets provides systematic feedback which is important in the evaluation. The time intervals between feedback provide an indication of the progress of the course. Workshops and the end of the year report also provide the teachers with opportunities to communicate their questions, problems, and opinions of the courses.

Students express their opinions of American Industry courses on two forms. A free response opinionnaire is completed at the end of the course. In this form, the student lists the classes he likes and dislikes and the reason(s) for his listing. In addition, he is asked to list his likes and dislikes related to the American Industry course. Several statements in the rating form employed to evaluate the written materials focus on the students' opinions of the quality and utility of the instructional materials. The students' knowledge of industry and problem solving skills are assessed by means of the Project's achievement test. This test has objective and essay portions. Their interests and activities are recorded on the Project's Student Questionnaire which is comprised of items selected from Project TALENT'S Student Information Blank (1964).

Guidance counselors provide ability and reading test scores to the Project. Administrators complete a form which describes the resources available in their schools and the curriculum offerings. They also comment on their school's relationship with the Project and raise any questions they may have.

The supervisor of participating teachers attempts to visit each participating teacher once a month while school is in session. During these visits he records the progress and problems identified by the participating teacher. He also notes the activities of the classes and interviews individual students.

A more subtle but very appropriate source of information is the condition of the instructional material when it is returned to the Project. Materials that have been used will show signs of wear, pencil or pen marks, and smudges. For example, several of the Project's overhead transparencies have a place to write in comments as the class discussion progresses. A clean transparency and mask indicate that it was not used in the manner it was designed for. Booklets with clean covers and tight bindings suggest that they were not opened very frequently.

The data collected are channeled to the research specialist for analysis and interpretation. During this stage of the evaluation, several comparisons are completed. Comparisons are made between the students in the American Industry classes and the students in the control groups. In as many schools as feasible, experimental designs are used for the evaluation. However, in some situations this is not possible and quasi-experimental designs have to be substituted.

Data from American Industry classes during previous school terms are also used in the analysis to identify any improvement or deterioration in performance over the given time period. These changes can then be correlated with revisions made in the courses, instructional materials, and teaching methods.

The effects or products of the study of American Industry can also be associated with the appropriate ingredients and processes. An example of the interrelationship between the three domains is provided by the evaluation of the student booklets used in American Industry classes. The following data are collected:

Ingredients	Processes	Products
Reading level of each booklet (Dale-Chall formula)	Teacher descriptions of uses made of the booklets (Feedback form)	Student opinions on reading level and content (Reading form)
Reading ability of the students (Reading test)	Supervisor's of Participating Teachers observations of the classroom use of the booklets	Teacher opinions of the utility of the booklets (Feedback form)
General ability of the students	Signs of wear and usage on the booklets	Student achievement

If student achievement is low in an area thoroughly discussed in the booklets, the possible cause or causes can be defined and evaluated. For instance, the students may not be able to read the material. This can be assessed by comparing the reading level of the material, the students' reading abilities, and their opinion of the readability of the material. In like manner, other causes of variations in performance may be determined.

Most of this information is very important to the curriculum specialist. In some instances it will verify his decisions--in others it will point out new directions or problem areas which need attention. Hence, it is important that the researcher work closely with the curriculum developer and that they comprehend each other's problems. On the American Industry Project this has been accomplished with substantial benefits to both functions.

Selected Evaluation Procedures, Instruments, and Outcomes

Previous pages have described the general nature and purpose of the evaluation system developed for the American Industry Project. Some of the evaluation procedures, data gathering instruments, and results will now be presented to illustrate how the system works and the type of outputs generated by it. This is not a complete enumeration, rather, it is a sample to demonstrate the characteristics of the system and the types of data collected. A full report on the research carried out by the Project will not be available until late in 1969.

Organization of the Instructor's Guide for Level I

One of the first problems encountered by the curriculum specialist was the design of a functional instructor's guide. This guide had to be flexible enough to be employed in a variety of industrial arts laboratories by industrial arts teachers with diverse backgrounds. At the same time, it had to embody the American Industry Project's rationale and take into account the nature of the learning process.

Three separate aspects were involved in designing the guide: (1) design of the format, (2) selection of the content, and (3) specification of the sequence of material. All three of these elements are discussed in detail in a paper by Richard Gebhart (1968). Thus, this paper will review them to the degree necessary to make the data gathering procedures and the resulting data meaningful.

The lesson format evolved over a three year period of experimentation with various forms. In the present form, each lesson consists of objectives, scope of the lesson, references, and content outline. The content portion of the lesson is written in narrative form. Material that is to be discussed or covered in discovery mode is set off in parentheses. Lessons vary in detail depending upon the teachers' backgrounds in the area involved. For example, the marketing lessons were written in a very detailed fashion while the processes lessons contained concise outlines. Another feature of the content portion of the lesson was the provision for utilizing instructional media. Instructions for using, the narration, and the discussion questions were placed at the point in the lesson where the instructional media was to be used.

Evidence on the utility and effectiveness of this lesson format and the design of the lesson content is presented in Table 1. The two items directly related to the format of the lessons in the guide, numbers seventeen and thirty-nine indicate that the format is functional and easy to follow. There is evidence that the teachers had some problems interpreting the parentheses (item twenty-two).

Table 1

Responses on the 1967-68 End of Year Report Related to Lesson Format and Content

Item No.[4]	Statement	Responses					
		SD	D	U	A	SA	NR
8.	I could not understand the material in the Instructor's Guide.....	9	3	4	1		
17.	The format of the guide is easy to follow.....			1	10	6	
21.	The narrative in the lessons did not give enough content.....	4	5	5	3		
22.	I could tell by the narrative in the lessons when I was to use discussion or other student involvement.....		2	5	3	2	
33.	The lessons did not go into enough depth.....	6	7	3	1		
34.	The instructional media were effectively correlated with the lessons.....		1	2	12	2	
39.	The format of the lessons is functional..			1	12	4	

Key to Responses: SD = Strongly Disagree, D = Disagree, U = Uncertain, A = Agree, SA = Strongly Agree, NR = No Response

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[4] Item number in the End of Year Report.

Most of the teachers felt that the lessons went into sufficient depth and provided enough information (items twenty-one and thirty-three). However, there were enough uncertain and agree responses on item twenty-one to stimulate further investigation of specific weaknesses. As a result, additional instructional materials were mailed to the teachers and workshop presentations were selected to provide more content background for the participating teachers. About seventy per cent of the teachers responded that they could understand the material in the guide (item eight). The actions mentioned above should also help the thirty per cent who had problems comprehending some or all of the guide.

Over eighty per cent of the participating teachers had little or no trouble integrating the instructional media with the lessons during their instruction (item thirty-four). This information substantiated the decision to include the scripts and directions for the utilization of the media at the point in the instructional sequence at which they were to be used.

A more difficult and intriguing problem was posed by the question of the best sequence in which to study the concepts and structure of industry. Psychological research suggested that a cyclical presentation of the subject matter would be most efficient. Through encounter with learning experiences related to a concept in a variety of situations and contexts the student has a chance to periodically refresh his memory and embellish this concept of the material being studied. To illustrate this point, consider the cyclical study of the concept of communication. In his first contact with the materials and activities related to this concept, the student will have only a slight knowledge of the other concepts in the structure of industry. Hence, the concept of communication formed by this student will be relatively simple and will be connected to only a few industrial referents. However, as the study of American Industry progresses throughout the school year, communication in its various forms will be revisited on several occasions. By means of this sequence, the student will experience communication activities in such areas as planning, production, management, procurement, and marketing. Thus, instead of forming a unidimensional concept, the student's concept of communication will have n dimensions where n should at least approach twelve and may exceed this number.

Two techniques developed by Gagne' (1965) were employed to determine the information and sequence of information to present in each cycle. Starting with the problem solving and knowledge of industry objectives established for the first course, the curriculum specialist and the research specialist determined the knowledges, concepts, and skills required to attain these objectives. The analysis proceeded from the two broad objectives back to the characteristics of the incoming students. Care was taken to identify logical and complete sequences of learning. Figure 5 presents a very brief summary of the taxonomical breakdown that resulted.

A TAXONOMICAL BREAKDOWN OF LEVEL I AMERICAN INDUSTRY

O. Nelson
R. Short

American Industry--Level I	Gagne' (1965)	Bloom (1965)	Psychomotor Domain
Solve Industrial Problems	-Problem Solving	-Through Level 6 Evaluation Through Level 5 Synthesis	
Interrelate Concepts	-Principle Learning		-General Procedure or Approach to Learning Manipulative Skills
Display a Conceptual Style of Reasoning; Apply Basic Concepts of Industry; Apply the Environmental Concepts	-Concept Learning	-Through Level 4 Analysis	
Identify Communication Acts (Other concept areas have been analyzed but are not shown on this chart)		-Through Level 3 Application	
Distinguish Between Two or More Different Symbols or Events	-Multiple Discrimination	-Through Level 2 Comprehension	
Identify Communication Symbols	-Chaining-Verbal	-Through Level I Knowledge	-Perform Specific Motor Skills (Taught to Individuals As Needed)
Draw Symbols	-Chaining-Motor		
Produce Labels For Communication Symbols	-S-R		

Some Beginning Competencies - Typical 8th Grade Students

1. Reading and Communication Skills
2. Mathematics Skills
3. Normal Psychomotor Development
4. Exposure to Local Enterprises
5. Experience in Handling and Spending Money
6. Etc.

Figure 5

After this analysis had been completed, the course outline was established in final form. (Figure 6 gives the Level I course outline and identifies the cycles in red.) Lesson themes were delineated and specific skills and information were allocated to the lessons on the basis of the analysis discussed in the previous paragraph. The information in the lessons included the appropriate interrelationships among the concepts. These interrelationships are vital to the study of the complete structure of industry. Writing assignments were then made.

Although care had been taken in planning and analyzing the content prior to writing, there was still a question as to the structure and content of the output. With several writers and pauses to complete other jobs there was a distinct possibility that some elements had been left out or placed in improper perspective. To evaluate this possibility, a lesson analysis procedure was developed by the research specialist.

An analysis matrix was developed with numerical labels for each concept, the attributes of the definition of industry, and the basic terms on the horizontal axis. The vertical axis in part one of the analysis sheet listed the major portions of the lesson. In the second part, which was concerned with the interrelationships established with other concepts, the vertical axis had the same categories as the horizontal axis.

Table 2 presents the concepts, attributes, basic terms and the numerical labels used in the analysis. Output from an analysis of the first communication lesson in Unit III is given in Table 3. Figures within the matrix represent levels in the taxonomy for the cognitive domain developed by Bloom. The left-hand column identifies in order the low taxonomy level present in the introduction, the high taxonomy level present, the number of instances at each taxonomy level, any introductory activity utilized, and the industrial problems included. The same sequence is utilized for the body and summary portions of the first part of the analysis.

A further explanation would probably be helpful in conveying the meaning of 'instances" as employed within the context of this analysis. By instance is meant a unitary bit of instruction which can stand by itself. Consider, for example, a specific illustration of communication in industry such as producing too few parts because of faulty instructions. This provides an "instance" to discuss in introducing the study of communication. As soon as the class directs its attention to another illustration or topic, a new "instance' is encountered.

A review of the output in Table 3, discloses that the introduction contained one instance at the first level in the cognitive taxonomy related to communication. In addition, there is one reference to industry indicated by the 1 in column 40. The body of the lesson starts at level one in the cognitive taxonomy and moves into the second level. In other words, the students are required to interpret and translate material related to instruction. Also, the attributes of communication are mentioned (note the 1 in the column labeled 50).

Finally, in the summary the students review the material and the teacher tests their concept of communication by asking them to apply it to a unique situation. This 'test" is indicated by the three at the high taxonomy level.

LEVEL I - AMERICAN INDUSTRY COURSE OUTLINE

TEACHER DIRECTED

	Units and Features	Unit Theme
Unit I	Industry Today 1. Introduction to American industry 2. Resources of industry 3. The environment of industry 4. The basic parts of industry	- Let's analyze industry.
Unit II	The Evolution of Industry 1. The needs of man 2. A search for greater productivity 3. Some effects of man's quest for productivity	- The needs of man and why he progressed.
Unit III	Organizing an Enterprise 1. Communication 2. Research 3. Management 4. Finance 5. Property 6. Energy	- Let's start a business.
Unit IV	Operating an Enterprise 1. Relationships 2. Procurement 3. Materials 4. Processes 5. Production	- Let's produce using modern production methods.
Unit V	Distributing Products and Services 1. Marketing 2. Transportation	- Why does a product sell?
Unit VI	The Future of Industry 1. State of the art 2. Reasons for change 3. Future expectations	- Where do we go from here?
Unit VII	The Students' Business Venture 1. Development 2. Fabrication 3. Marketing 4. Evaluation	- The students organize, produce, and sell.

STUDENT DIRECTED

Figure 6

Table 2

NUMERICAL LABELS FOR THE AMERICAN INDUSTRY STRUCTURE AND DEFINITION

A. Ball Concepts

Numerical Label	Concept
1	Communication
2	Transportation
4	Finance
5	Property
6	Research
7	Procurement
8	Relationships
9	Marketing
10	Management
11	Production
12	Materials
13	Processes
14	Energy

B. Ring Concepts

Numerical Label	Concept
20	Government
21	Private Property
22	Resources
23	Competition
24	Public Interest

C. Attributes of the definition of industry:

Numerical Label	Concept
40	Institution in our society (also indicates the entire definition of industry)
41	Applies knowledge
42	Utilizes resources (human and natural)
43	Produces goods and services
44	Meets needs of man
45	For monetary profit

D. Other basic terms used:

Numerical Label	Concept
50	Attributes, characteristics, or similarities
51	Concept, conceptual
60	Productivity
70	Student booklets and/or reading materials

LESSON ANALYSIS FOR. LEVEL 1 UNIT 3 LESSON 1 DATE 12/13/67 1301001
THEME. INTRODUCTION TO COMMUNICATION 1301002
TIME. 010 PERIOD 1301003
CONCEPTS. BALL RING ATTRIBUTES 1301004

PORTION.	1	2	4	5	6	7	8	9	10	11	12	13	14	20	21	22	23	24	40	41	42	43	44	45	50	51	60	70	1301005
INTRO LO TAX LEV	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1301006
INTRO HI TAX LEV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301007
INTRO NO AT LO	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1301008
INTRO NO AT HI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301009
INTRO ACTIVITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301010
INTRO IND PROB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301011
																													1301012
BODY LO TAX LEV	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1301013
BODY HI TAX LEV	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301014
BODY NO AT LO	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1301015
BODY NO AT HI	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301016
BODY ACTIVITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301017
BODY IND PROB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301018
																													1301019
SUMMARY LO TAX	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301020
SUMMARY HI TAX	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301021
SUM NO AT LO	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301022
SUM NO AT HI	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301023
LESSON ACTIVITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301024
																													1301025
INTERRELATIONSHIPS MATRIX																													1301026
CONCEPTS. BALL RING ATTRIBUTES																													1301027

CONCEPTS ATTRIB	1	2	4	5	6	7	8	9	10	11	12	13	14	20	21	22	23	24	40	41	42	43	44	45	50	51	60	70	1301028
01 LOW TAX LEVEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1301029
01 HI TAX LEVEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301030
01 NO AT LOW TAX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1301031
01 NO AT HI TAX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1301032

Table 3

Lesson Analysis Output

A look at the interrelationships matrix in the bottom portion of Table 3 reveals that the concept of communication was related to industry. During Unit I the students acquired a concept of industry, now, in Unit III they start to study the major concepts encompassed in the Project's structure of industry. Hence, this interrelationship is logical and is in proper sequence to demonstrate the role of communication in industry.

All of the lessons in the Level I instructor's guide have been analyzed with this procedure. In addition to the output for each lesson, the data cards can be sorted to provide a listing of each lesson in which a concept appears. Placing these in the sequence in which the lessons appear in the guide reveals the sequence and distribution of the instructional materials related to each concept. These can then be checked against the original design of the guide. For instance, on a previous page it was noted that the guide would be written to present materials related to communication at several points within the course. One example given was the role of communication in advertising, thus, one should find this noted in the analysis for one or more of the marketing lessons. Indeed, the analysis for lesson four in Unit IV indicates that the marketing concept, number 9, is interrelated to the communications concept, number 1, as shown in the portion of the interrelationships matrix reproduced below.

INTERRELATIONSHIPS MATRIX

	CONCEPTS.	BALL							RING				ATTRIBUTES															
CONCEPTS ATTRID	1	2	4	5	6	7	8	9	10	11	12	13	14	20	21	22	23	24	40	41	42	43	44	45	50	51	60	7
09 LOW TAX LEVEL	1	0	2	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
09 HI TAX LEVEL	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
09 NO AT LOW TAX	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0
09 NO AT HI TAX	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Interpretation of the numbers in this matrix indicates that students study the relationship of communication to advertising starting at the first level in the taxonomy and progress to the synthesis level (level five). This synthesis is attained through the actual design and production of advertising.

The data from this analysis have been helpful in making minor revisions in the guide during the past year. From this experience, it was also evident that this information will be very useful when a more complete study and revisions of the guide are made.

Up to this point the techniques for structuring instructional materials and reviewing the characteristics of the completed materials have been described; however, one of the most critical tests remains--the teachers' evaluation of their effectiveness in the classroom. To acquire this information, feedback sheets were placed at the end of each lesson. Item eight in this form asked the teachers to indicate if the lesson rated fit into the overall instructional sequence. There were 571 responses to this item with 547 of these responses indicating that the lesson rated fit into the instructional sequence. Eight responses evaluated a lesson as not being in proper sequence. And, on sixteen sheets this item was left blank. Item five in the feedback form provides information on the structure of the lessons. Only eleven of the 564 responses to this item said that the lesson was not logically structured. Thus, the data provide conclusive evidence of the logical structure and sequence built into the instructional materials.

Whereas the instructional materials discussed in this section had to be constructed on the basis of techniques that had not had extensive use or formal evaluation, the data collected during the development and tryout phases provided an essential source of information for evaluating the quality of these materials. In addition, these data can also be used to assess the validity of the procedures employed in developing the instructional materials. The operating characteristics of the data collection procedures provide evidence on their efficiency and utility. Thus, relevant information exists for further revisions of the materials, the procedures used in constructing them are substantiated by empirical evidence, and the characteristics of the data gathering system are known.

Products of the Study of American Industry--Student Outcomes

Two aspects of the evaluation of student outcomes will be reviewed in the ensuing pages. First, a brief description of the Project's achievement test and a general overview of the performance of the experimental and control groups on the test will be given. Second, selected attitudes, interests, and opinions of a sample of the students involved in the evaluation will be summarized and discussed.

Since the American Industry courses were based on a unique set of concepts and structure of the knowledges of industry, an achievement test had to be constructed to measure these constructs and content. As the specifications for the test were distilled the decision was made to limit the time required to complete this instrument to approximately fifty minutes. This was done to reduce the amount of time the students spent completing evaluation forms and to deter an overemphasis on one evaluation technique. If the group of students in the evaluation had been larger, tests could have been made for each concept area and administered to sub-samples of the group.

The basic task in writing the test was one of devising items that would efficiently sample behaviors critical to the objectives of the American Industry courses. Since the essential aspects of these courses were the study of concepts, the solving of problems, and the study of structure, the majority of the items in the test were related to one or more of these elements. In addition, some items at the knowledge level were included to assess the validity of the taxonomical structure of the levels of learning posited in Figure 5.

Items were written for each conceptual area and problems were defined which would cut across several conceptual areas in order to test the knowledge of the interrelationships of the concepts. In addition, several items were written which could be answered on the basis of "pure" conceptual thinking without recourse to the concepts of industry. Approximately eighty per cent of the items in the final form of the test were concerned with applying the concepts and structure of industry to problems or situations in industry. Five per cent tested conceptual thinking and the remaining fifteen per cent assessed factual knowledge.

The items in the objective portion of the test are four choice multiple-choice questions. In most instances a problem situation provides the basis for the item stems. When possible the alternative responses for an item were constructed to provide information on the responder's cognitive structure or lack of knowledge. An illustration of this is given by the test item reproduced in Table 4. In this problem, the distractors disclose whether the student has information on the cost, insulative qualities, and strength of common materials. If, for example, a student thought that materials were selected for their strength, he would select D as the appropriate choice.

The response distributions for all of the American Industry and control group students on this item are:

Response	American Industry	Control
A	7.3%	11.4%
B	74.1%	57.0%
C	13.9%	21.2%
D	4.7%	10.4%

These data indicate that the control group students are more likely to base their choices on the more salient characteristics of materials.

Comparisons can also be made between a control group and the classes taught by a specific teacher to determine if a particular bias is inherent in his instruction. For example, last year it was found that the students in one school were prone to select the distractor based on the finance concept when it was included in an item. This fact was communicated back to the teacher. In addition, this information suggested a need for problem solving exercises to develop the students' ability to deal with several relevant factors when solving a problem.

Table 4

CATEGORIZATION FORM FOR EVALUATION ITEMS

Directions: Fields are defined by capital letters, card columns by numbers reproduced on the master sheet. Numbers or signs written on this form are to be punched in the columns designated under the blank.

A. Item number; b/1 0/2 4/3 5/4 0/5

Concepts evaluated: B. First order: b/6 1/7 2./8 0/9 0/10 0/11

C. Second order: b/12 0/13 1./14 0/15 0/16 0/17

D. Third order: b/18 0/19 8./20 0/21 0/22 0/23

E. Fourth order: b/24 0/25 4./26 0/27 0/28 0/29

F. Relative Emphasis on concept order: b/30 0/31 1/32

G. Taxonomy level: b/33 4./34 0/35 0/36 0/37

H. Type of item b/38 0/39 1/40

I. Difficulty: b/41 6/42 5./43 6/44 (%)

J. Discrimination: b/45 ./46 5/47 3/48 6/49 1/49

Author of item: _____

Why would mahogany paneling be used in the office of the president of an enterprise?

A. To reduce building costs
*B. To communicate his status
C. To improve the insulation of the office
D. To strengthen the office walls

Each test item was written on the form presented in Figure 4. The information recorded in the first portion of the form identifies the concept or concepts related to the question. Ir this example the concepts are materials (12), communication (1), relationships (8), and finance (4). Each of these would have an equal bearing on the solution; thus, the relative emphasis is rated as equal (1).

This item requires analysis of the situation given in the stem. Therefore, it is placed at level four in the cognitive taxonomy. Naturally, this assumes that the students have not seen this problem before. To insure this, the Project maintains the achievement test as a secure test and does not distribute it with the instructional materials or release it for review. Item type is listed as multiple-choice (1). The numbers representing the varicus types of items are arbitrarily assigned labels.

Difficulty and discrimination values accrued as the item was administered to various groups. Whenever possible, test items were tried out on a pilot group prior to their use in the formal evaluation. After an item was placed in the achievement test, information on its operating characteristics was obtained from the Generalized Item and Test Analysis Program (GITAP) developed by Dr. Baker at the University of Wisconsin (1966). A sample of the output from this program for the item in Table 4 is reproduced below.

ITMNO	CHOICE	WT	NR	DIFFICULTY	R	X50	BETA
36	1	0	2	.0444	-.1729	-9.8411	-.1755
36	2	1	29	.6444	.5408	-.6802	.6430
36	3	0	10	.2222	-.5728	-1.3305	-.6987
36	4	0	4	.0889	-.0900	-14.9671	-.0903

Starting at the left, the first three columns identify the item, the response choices, and the weight given to each response. (A weight of 1 is given to the correct response in this example.) The next two columns list the number of students selecting each response and the proportion represented by these numbers. Column five gives the biserial item-criterion correlation. In this analysis, the test score is the criterion. The last two columns present the parameters for the item characteristics curve (Baker, 1964). X_{50} identifies the point on the criterion scale, distribution of total test scores, at which half of the people with the given criterion score selected the response under consideration. These values are in the standard deviation units of the total test score distribution. Hence, fifty per cent of the people with test scores .68 standard deviation units below the mean test score would select the correct choice for this item. Beta gives an approximate value of the scope of the item characteristics curve at X_{50} and indicates the discriminating power of the item. For this administration of the item, these parameters indicate that the item is relatively easy and has positive discrimination.

GITAP also calculates test reliability utilizing the Hoyt analysis of variance method. Reliabilities for the Project's achievement test calculated on the basis of test results from individual American Industry classes range from .74 to .91. The median value of these reliabilities is .82. No doubt these reliabilities could be improved by discarding the items which usually discriminate poorly. However, the decision to keep or discard has not been made on this basis alone. Equally important was the nature of the item and the information it contributed to the evaluation. In other words, if there was no observable defect in the item and it provided important data, the item was kept in the test and questions were raised concerning the reasons for the poor results on this item. Most of these questions lead to a review of the ingredients and processes information related to the output being studied.

Content validity of the achievement test was relatively easy to establish. The item form shown in Figure 4 clearly defines the concept areas and interrelations measured by each item. And, the taxonomy level is identified. With this information items can be selected to evaluate all of the concepts and a portion of the interrelationships in the Project's structure of Industry. Determination of construct and criterion-related validity will have to await further data collection.

A general analysis of the test results during the 1967-68 school year disclosed the following outcomes for the eighteen and thirty-six week courses.

Length of Course	Outcomes of Comparisons: American Industry vs. Control Groups			
	A.I. Lower	Same	A.I. Better-- Not Significant	A.I. Significantly Better, $P<.05$
18 Week Course		5	3	3
36 Week Course	1	0	3	4

As could be expected, the thirty-six week courses produce proportionally more significant results than the shorter course. Likewise, the longer course has proportionately more comparisons that favor American Industry but do not attain significance (differences between test means in this category range from 1.5 - 4 points). In contrast, the eighteen week course has several comparisons in which the means of the experimental and control groups are for all practical purposes the same (differences in this category are less than one point). One

American Industry class achieved less than the control group ($\bar{X}_E - \bar{X}_C = -1.5$). However, this comparison was made in a quasi-experimental design in which the control group had higher ability scores.

More detailed analyses may change the composition of the "A.I. Lower," "Same," and "A.I. Better" categories. However, there should be little if any change in the "Significant" category. At the present time, the data collected in the evaluation are being placed on a disk file for efficient retrieval and more sophisticated analyses. These analyses should produce a more definitive picture of the effects of the study of American Industry and the causes of these effects.

The ensuing paragraphs present and discuss responses on a student opinionnaire completed at the end of the school term. Some interesting differences appear and the data also provide the basis for establishing some correlates between performance on the achievement test and the learning activities encountered by the students.

At the end of the 1967-68 school year students in a sample of the American Industry and control classes, were asked to respond to the forty statements listed in Tables 5 and 6. Five responses were designated on the response sheet: "strongly disagree," "disagree," "undecided," "agree," and "strongly agree." In Tables 5 and 6 these responses are represented by SD, D, U, A, and SA respectively. The sixth heading, NR, indicates the number not responding.

Table 5 gives a summary of the responses made by the American Industry students who completed the opinionnaire. Table 6 presents a similar summary for students who did not take American Industry. In both tables the first figure in each column gives the total number of students marking the given response. The second figure in parentheses, lists the per cent of the group that marked the response.

Data in these tables do not represent all of the students encompassed in the Project's evaluation. A random sample of schools was selected in order to reduce the total time required to complete evaluation instruments in the participating centers. Also, the variation in evaluation designs within the selected schools resulted in the difference in number between the American Industry and control groups.

The analyses reported in subsequent paragraphs are based on the data in Tables 5 and 6. As noted above, these data are summed over several schools and grade levels. In addition, it was assumed that the level of measurement represented by the response area between SD and SA was ordinal. Hence, statistical tests were selected to evaluate ordinal data and the analysis in general was kept at a gross level. These are two important constraints but they do not reduce the value of the data in answering certain important questions as will be pointed out later.

Four general areas were designated within which to construct items for the opinionnaire. These areas were occupational behaviors, attitude toward

industry, interest in industry, and class activities. Each of these areas was selected because it would provide relevant data. The first three pertain to general outcomes of the course. Tha last category, class activities, concerns specific opinions related to the nature of industry and the structure of the American Industry course. It was included to assess the effects of various learning conditions and activities built into the course.

The areas and the numbers of the items encompassed in each are listed below:

Occupational Behaviors	Attitude Toward Industry	Interest In Industry	Class Activities
8	4	1	3
13	7	2	11
35	9	5	12
38	10	6	16
39	14	15	17
	18	20	23
	19	22	24
	21	29	26
	25	34	27
	28		32
	30		37
	31		
	33		
	36		
	40		

Two statistical comparisons were made using the data that appear in Tables 5 and 6. First, chi square values were calculated for the American Industry and control group data on each item. Next, the two groups were compared on the complete set of responses in each category.

The values obtained for the chi square statistic disclosed significant differences, $P<.05$, on ten items. Further investigation of these items revealed that in each case the response patterns favored the American Industry students. The significant items and the categories in which they

are located are listed below.

A. Occupational behaviors

Item 13. I will probably work in industry.

Item 38. There are many job opportunities in industry that I did not know about before taking this class.

B. Attitude toward industry

Item 21. Industry has little influence on me.

Item 25. Industry charges too much for its products.

Item 28. Industry offers a variety of job opportunities.

Item 31. I have greater appreciation for industry after studying it in class.

Item 36. Products produced by industry are usually of low quality.

Item 40. Industry provides an opportunity for people to develop their abilities.

C. Interest in industry

Item 6. I find it interesting to look at the designs used used in the products sold in local stores.

D. Class activities

Item 26. I had a chance in this class to develop some of my ideas for products.

Of the four categories, attitudes toward industry and occupational behaviors apparently are influenced most strongly by the study of American Industry. However, the significant items in the remaining two categories also shed light on the outcomes of the study of American Industry. For instance, the responses on item 26 indicate that the American Industry students had a greater opportunity to solve problems in class.

The second analysis entailed a comparison of the total set of responses within each category. For this analysis, the responses SD, D, U, A, and SA were given the values 1, 2, 3, 4, and 5 with five being assigned to the most favorable response. The mean response was then calculated for each group on each item. Comparisons were made on each item to determine which group responded more favorably. In addition, the response patterns were checked to determine what effect a change in scale values would have on the results. In other words, if the extreme responses received more weight, what would happen to the results? These effects were also recorded. Table 7 presents

a summary of these data and the comparisons on individual items.

The exact probability of obtaining the results found in each category was calculated by employing the binomial expansion. Use of this statistic was based on the null hypothesis that the responses of the American Industry and control groups represent the same opinions and behaviors. If this hypothesis is true, then either group should have an equal chance of responding more favorably to any given item in the opinionnaire. To illustrate this, consider the items in the attitude toward industry category. If the conditions in the null hypothesis were true, one would expect that each group would have about the same number of items on which its members responded more favorably. However, in this administration the American Industry group responded more favorably on twelve of the fifteen items. The probability of attaining this result if the null hypothesis were true is less than four chances in a thousand.

Outcomes of two of the analyses remain the same under both scaling procedures. American Industry students exhibit a significantly more favorable attitude toward industry ($P<.004$) and response to the items related to their class activities ($P<.033$).

No significant differences were observed in the remaining two categories. Neither scaling procedure would appear to affect these results. The occupational behavior category contains only five items and, thus, all of the comparisons would have to favor one group in order to attain a significant difference. In the interest in industry category, the comparisons favor the American Industry students, $P<.09$, but do not exceed the commonly accepted significance level of .05.

An analysis of these results reveals several interesting outcomes. The chi square tests identify ten items in which there is a significant difference between the response patterns of the American Industry students and the control groups. All of these differences favor the American Industry students, a fact that is of considerable significance in itself. Moreover, each category in the opinionnaire has one or more items on which a significantly different response pattern was found. This indicates that the study American Industry had some effect in each of these areas.

Analysis of the complete set of individual item comparisons for each category indicated that the American Industry students responded more favorably on the attitude toward industry and class activities items. Hence, it would appear that the American Industry students have had a positive shift in their attitudes toward industry. They also show a more positive attitude toward the opportunities and products associated with industry. No doubt some of this positive effect carries over to item 13 in which a significantly larger number of American Industry students express a preference for working in industry.

The significant difference found in the set of items related to class activities may be of greater interest to the Project staff than to other people since these items are somewhat specific to the design of the American Industry courses. However, few people will probably quarrel with

with the educational relevance of the significant difference found on item 26 which reads "I had a chance in this class to develop some of my ideas for products." These data are germane to the Project's objective to develop the problem solving ability of students. The reader is encouraged to review the results on the remaining items in this category and judge their relevance for his work.

In the area of occupational behaviors, the two items, 13 and 38, which were significantly different in the chi square tests indicate that the study of American Industry increases the students perspectives of the jobs available in industry and their interest in seeking employment in one of them. Both of these effects are important and relevant to the contemporary educational scene.

As noted in the first part of this report, the data in Tables 1 and 2 were obtained from several schools. There was some concern that one or two schools might contribute most to the effects observed. However, review of the results in the individual schools indicated that the statistics for individual classes varied only slightly from those given in Tables 5, 6, and 7.

Other interesting facts of a noncomparative nature can be found in the data reported. Student interest in visiting a business, for example, was very high in both the American Industry and control groups. This would appear to be a good learning activity to satisfy student interests and develop new insights into industry. Also, a large number in both groups, about 75 per cent, were aware of the changing nature of jobs in industry. The reader's interest may delineate further items and data of interest as he reads the tables.

Summary

The evaluation system described in this paper was designed to provide data for evaluation and curriculum decisions. Outcomes of the study of American Industry form the basic criteria for making judgments and decisions. In addition, data related to the characteristics of the ingredients and the learning and instructional processes are collected. This information provides a basis for defining the causes of the outcomes, determining differential effects of the study of American Industry, and isolating the elements that need further study. Specific data collection procedures and instruments were developed to acquire the needed information. Thus, for example, the achievement test was designed to provide data on the essential elements in the Project's rationale instead of selecting items that would maximize differences between the experimental and control groups.

Studies reported in the previous section illustrate the types of data collected. Also they give some evidence of the effects of the study of American Industry. These reports, however, are based on a general analysis of the data. A complete evaluation report will be completed next year.

TABLE 5
UNIT 7 TEST, PART II:
Summary of Responses Made By 1967-68
American Industry Students

STATEMENT	RESPONSE#					
	SD	D	U	A	SA	NR
1. I would like to visit a business to see how it operates.	14(3.3)	17(4.0)	32(7.5)	178(41.7)	175(41.0)	11(2.6)
2. I like to look at products produced by industry . . .	5(1.2)	22(5.2)	72(16.9)	224(52.5)	90(21.1)	14(3.3)
3. All jobs in a business contribute to its profits. . .	19(4.4)	42(9.8)	86(20.1)	155(36.2)	111(26.0)	14(3.3)
4. Industry has interesting jobs to offer.	7(1.6)	25(5.9)	52(12.2)	180(42.2)	148(34.7)	15(3.5)
5. I look at advertising to see what sales appeals are used.	23(5.4)	81(19.0)	111(26.0)	156(36.5)	40(9.4)	16(3.7)
	SD	D	U	A	SA	NR
6. I find it interesting to look at the designs used in the products sold in local stores.	18(4.2)	59(13.8)	106(24.8)	187(43.8)	41(9.6)	16(3.7)
7. Industry cannot use creative people.	275(64.4)	56(13.1)	44(10.3)	24(5.6)	12(2.8)	16(3.7)
8. Some day I might start a business of my own	30(7.0)	55(12.9)	184(43.1)	91(21.3)	50(11.7)	17(4.0)
9. Industry provides products I need.	14(3.3)	18(4.2)	25(5.9)	154(36.1)	200(46.8)	16(3.7)
10. Industry does not need people with skills	278(65.1)	60(14.1)	26(6.1)	27(6.3)	18(4.2)	18(4.2)
	SD	D	U	A	SA	NR
11. Getting along with other people is important in industry.	10(2.3)	19(4.4)	42(9.8)	141(33.0)	198(46.4)	17(4.0)
12. Selling products is an important part of industry . .	11(2.6)	12(2.8)	19(4.4)	159(37.2)	208(48.7)	18(4.2)
13. I will probably work in industry.	32(7.5)	64(15.0)	161(37.7)	105(24.6)	48(11.2)	17(4.0)
14. Industry does an efficient job of producing products.	14(3.3)	23(5.4)	74(17.3)	237(55.5)	60(14.0)	19(4.4)
15. When I am in a store and have time, I look at construction of the products displayed.	25(5.9)	86(20.1)	90(21.1)	174(40.7)	36(8.4)	16(3.7)
	SD	D	U	A	SA	NR
16. People have to be able to follow orders in industry .	15(3.5)	17(4.0)	25(5.9)	169(39.6)	182(42.6)	18(4.2)
17. I like to compare products before buying one.	15(3.5)	24(5.6)	43(10.1)	191(44.7)	135(31.6)	19(4.4)
18. Industry needs people who have knowledge.	10(2.3)	14(3.3)	38(8.9)	152(35.6)	198(46.4)	15(3.5)
19. The more skilled a worker is the more pay he receives.	26(6.1)	38(8.9)	63(14.8)	162(37.9)	122(28.6)	16(3.7)
20. I like to look at the way materials are used in various products sold in the local stores	19(4.4)	55(12.9)	129(30.2)	168(39.3)	35(8.2)	21(4.9)

#The first figure indicates the number of individuals that selected the response. The number in the parenthesis is the percent of the total group that selected the response.

Table 5--Unit 7 Test, Part II (cont'd)

STATEMENT	RESPONSE#					
	SD	D	U	A	SA	NR
21. Industry has little influence on me.	183(42.9)	128(30.0)	46(10.8)	37(8.7)	16(3.7)	17(4.0)
22. I want to find out more about industry	21(4.9)	37(8.7)	139(32.6)	159(37.2)	53(12.4)	18(4.2)
23. Industry continuously develops jobs that require new skills	7(1.6)	19(4.4)	39(9.1)	196(45.9)	145(34.0)	21(4.9)
24. I have some ideas for products that could be sold.	26(6.1)	82(19.2)	140(32.8)	108(25.3)	45(10.5)	26(6.1)
25. Industry charges too much for its products	27(6.3)	102(23.9)	171(40.0)	64(15.0)	42(9.8)	21(4.9)
	SD	D	U	A	SA	NR
26. I had a chance in this class to develop some of my ideas for products	31(7.3)	50(11.7)	80(18.7)	192(45.0)	51(11.9)	23(5.4)
27. All jobs in an enterprise are important.	11(2.6)	24(5.6)	55(12.9)	212(49.6)	100(23.4)	25(5.9)
28. Industry offers a variety of job opportunities . .	7(1.6)	16(3.7)	37(8.7)	219(51.3)	123(28.8)	25(5.9)
29. I have read several news articles on the strikes held this year	40(9.4)	63(14.8)	62(14.5)	186(43.6)	53(12.4)	23(5.4)
30. Industry is not an important part of our society .	239(56.0)	76(17.8)	27(6.3)	38(8.9)	20(4.7)	27(6.3)
	SD	D	U	A	SA	NR
31. I have greater appreciation for industry after studying it in class	22(5.2)	25(5.9)	101(23.7)	172(40.3)	77(18.0)	30(7.0)
32. A successful business depends on a variety of jobs done well	17(4.0)	21(4.9)	37(8.7)	189(44.3)	136(31.9)	27(6.3)
33. Industry could survive without profits	206(48.2)	91(21.3)	47(11.0)	32(7.5)	19(4.4)	32(7.5)
34. I sometimes look at products in local stores to see how they are made.	17(4.0)	63(14.8)	87(20.4)	177(41.5)	51(11.9)	32(7.5)
35. This class has changed my thinking about the work I will do after my schooling has been completed. .	50(11.7)	90(21.1)	124(29.0)	87(20.4)	42(9.8)	34(8.0)
	SD	D	U	A	SA	NR
36. Products produced by industry are usually of low quality.	93(21.8)	165(38.6)	74(17.3)	47(11.0)	11(2.6)	37(8.7)
37. Producing the product is the most important part of a successful business	35(8.2)	93(21.8)	100(23.4)	125(29.3)	38(8.9)	36(8.4)
38. There are many job opportunities in industry that I did not know about before taking this class. . .	13(3.0)	64(15.0)	72(16.9)	185(43.3)	53(12.4)	40(9.4)
39. This class has started me thinking about the work I will do after my schooling is done	38(8.9)	67(15.7)	118(27.6)	126(29.5)	38(8.9)	40(9.4)
40. Industry provides an opportunity for people to develop their abilities.	10(2.3)	18(4.2)	46(10.8)	208(48.7)	105(24.6)	40(9.4)

TABLE 6
UNIT 7 TEST, PART II:
Summary of Responses Made by 1967-68
Control Group Students

	STATEMENT	RESPONSE#					
		SD	D	U	A	SA	NR
1.	I would like to visit a business to see how it operates.	7(4.5)	3(1.9)	15(9.6)	93(59.2)	34(21.7)	5(3.2)
2.	I like to look at products produced by industry . . .	3(1.9)	14(8.9)	27(17.2)	82(52.2)	27(17.2)	4(2.5)
3.	All jobs in a business contribute to its profits. . .	7(4.5)	21(13.4)	30(19.1)	68(43.3)	28(17.8)	3(1.9)
4.	Industry has interesting jobs to offer.	4(2.5)	18(11.5)	15(9.6)	72(45.9)	41(26.1)	7(4.5)
5.	I look at advertising to see what sales appeals are used.	15(9.6)	37(23.6)	44(28.0)	50(31.8)	7(4.5)	4(2.5)
		SD	D	U	A	SA	NR
6.	I find it interesting to look at the designs used in products sold in local stores	19(12.1)	24(15.3)	34(21.7)	59(37.6)	17(10.8)	4(2.5)
7.	Industry cannot use creative people	86(54.8)	33(21.0)	16(10.2)	11(7.0)	6(3.8)	5(3.2)
8.	Some day I might start a business of my own	14(8.9)	18(11.5)	67(42.7)	26(16.6)	26(16.6)	6(3.8)
9.	Industry provides products I need	8(5.1)	5(3.2)	7(4.5)	62(39.5)	69(43.9)	6(3.8)
10.	Industry does not need people with skills	93(59.2)	24(15.3)	13(8.2)	21(13.4)	2(1.2)	4(2.5)
		SD	D	U	A	SA	NR
11.	Getting along with other people is important in industry.	6(3.8)	12(7.6)	12(7.6)	60(38.2)	61(38.9)	6(3.8)
12.	Selling products is an important part of industry . .	3(1.9)	5(3.2)	7(4.5)	61(38.9)	75(47.8)	6(3.8)
13.	I will probably work in industry.	34(21.7)	18(11.5)	67(42.7)	26(16.6)	8(5.1)	4(2.5)
14.	Industry does an efficient job of producing products.	6(3.8)	16(10.2)	28(17.8)	71(45.2)	29(18.5)	7(4.5)
15.	When I am in a store and have time, I look at the construction of the products displayed.	7(4.5)	33(21.0)	31(19.7)	70(44.6)	8(5.1)	8(5.1)
		SD	D	U	A	SA	NR
16.	People have to be able to follow orders in industry .	4(2.5)	4(2.5)	13(8.3)	53(33.8)	79(50.3)	4(2.5)
17.	I like to compare products before buying one.	4(2.5)	14(8.9)	13(8.3)	71(45.2)	51(32.5)	4(2.5)
18.	Industry needs people who have knowledge.	2(1.3)	10(6.4)	20(12.7)	58(36.9)	61(38.9)	6(3.8)
19.	The more skilled a worker is the more pay he receives.	9(5.7)	17(10.8)	24(15.3)	51(32.5)	48(30.6)	8(5.1)
20.	I like to look at the way materials are used in various products sold in the local stores	5(3.2)	23(14.6)	45(28.7)	60(38.2)	16(10.2)	8(5.1)

#The first figure indicates the number of individuals that selected the response. The number in the parenthesis is the percent of the total group that selected the response.

Table 6--Unit 7 Test, Part II (cont'd)

STATEMENT	RESPONSE#					
	SD	D	U	A	SA	NR
21. Industry has little influence on me.	42(26.8)	58(36.9)	30(19.1)	14(8.9)	8(5.1)	5(3.2)
22. I want to find out more about industry	10(6.4)	24(15.3)	40(25.5)	57(36.3)	18(11.5)	8(5.1)
23. Industry continuously develops jobs that require new skills	2(1.3)	9(5.7)	25(15.9)	64(40.8)	51(32.5)	6(3.8)
24. I have some ideas for products that could be sold. . .	13(8.3)	39(24.8)	44(28.0)	37(23.6)	17(10.8)	7(4.5)
25. Industry charges too much for its products	6(3.8)	20(12.7)	52(33.1)	37(23.6)	31(19.7)	11(7.0)
	SD	D	U	A	SA	NR
26. I nad a chance in this class to develop some of my ideas for products	18(11.5)	33(21.0)	36(22.9)	50(31.8)	9(5.7)	11(7.0)
27. All jobs in an enterprise are important.	6(3.8)	15(9.6)	18(11.5)	69(43.9)	35(22.3)	14(8.9)
28. Industry offers a variety of job opportunities	9(5.7)	15(9.6)	12(7.6)	72(45.9)	38(24.2)	11(7.0)
29. I have read several news articles on the strikes held this year.	12(7.6)	17(10.8)	17(10.8)	64(40.8)	34(21.7)	13(8.3)
30. Industry is not an important part of our society . . .	79(50.3)	26(16.6)	18(11.5)	15(9.6)	2(1.3)	17(10.8)
	SD	D	U	A	SA	NR
31. I have greater appreciation for industry after studying it in class	15(9.6)	23(14.6)	36(22.9)	43(27.4)	25(15.9)	15(9.6)
32. A successful business depends on a variety of jobs done well.	4(2.5)	6(3.8)	20(12.7)	69(43.9)	41(26.1)	17(10.8)
33. Industry could survive without profits	73(46.5)	39(24.8)	14(8.9)	10(6.4)	6(3.8)	15(9.6)
34. I sometimes look at products in local stores to see how they are made.	8(5.1)	23(14.6)	29(18.5)	57(36.3)	26(16.6)	14(8.9)
35. This class has changed my thinking about the work I will do after my schooling has been completed. . . .	24(15.3)	34(21.7)	48(30.6)	27(17.2)	11(7.0)	13(8.3)
	SD	D	U	A	SA	NR
36. Products produced by industry are usually of low quality.	18(11.5)	51(32.5)	34(21.7)	29(18.5)	10(6.4)	15(9.6)
37. Producing the product is the most important part of a successful business.	18(11.5)	25(15.9)	26(16.6)	58(36.9)	17(10.8)	13(8.3)
38. There are many job opportunities in industry that I did not know about before taking this class.	7(4.5)	27(17.2)	40(25.5)	42(26.8)	27(17.2)	14(8.9)
39. This class has started me thinking about the work I will do after my schooling is done	20(12.7)	33(21.0)	38(24.2)	36(22.9)	17(10.8)	13(8.3)
40. Industry provides an opportunity for people to develop their abilities.	12(7.6)	11(7.0)	23(14.6)	64(40.8)	34(21.7)	13(8.3)

TABLE 7

Comparison of Average Response Values

Item	Category	Average Response Values			Effects of Rescaling	
		American Industry	Control	Result of Comparison	Effect on A.I.	Possible Result of New Comparison
	Occupational Behavior					
8		3.19	3.21	C	-	C
13		3.18	2.71	A.I.	+	A.I.
35		2.95	2.77	A.I.	+	A.I.
38		3.51	3.38	A.I.	-	?
39		3.22	2.98	A.I.	+	A.I.
	Attitude Toward Industry					
4		3.96	3.85	A.I.	+	A.I.
7		3.42	3.20	A.I.	+	A.I.
9		4.24	4.19	A.I.	+	A.I.
10		3.42	3.25	A.I.	+	A.I.
14		3.75	3.67	A.I.	-	C
18		4.25	4.10	A.I.	+	A.I.
19		3.77	3.75	A.I.	-	C
21		3.04	2.74	A.I.	+	A.I.
25		3.02	1.54	A.I.	+	A.I.
28		4.08	3.79	A.I.	+	A.I.
30		3.19	3.18	A.I.	+	A.I.
31		3.64	3.28	A.I.	+	A.I.
33		3.10	3.15	C	O	C
36		2.73	2.27	A.I.	+	A.I.
40		3.98	3.67	A.I.	+	A.I.
	Interest in Industry					
1		4.16	3.95	A.I.	+	A.I.
2		3.90	3.76	A.I.	+	A.I.
5		3.27	2.98	A.I.	+	A.I.
6		3.42	3.20	A.I.	O	A.I.
15		3.27	3.26	A.I.	+	A.I.
20		3.36	3.40	C	-	C
22		3.45	3.28	A.I.	+	A.I.
29		3.36	3.66	C	-	C
34		3.46	3.49	C	-	C
	Class Activities					
3		3.72	3.58	A.I.	+	A.I.
11		4.21	4.05	A.I.	+	A.I.
12		4.32	4.32	Even	O	C
16		4.18	4.30	C	-	C
17		4.00	3.99	A.I.	-	C
23		4.12	4.01	A.I.	+	A.I.
24		3.16	3.04	A.I.	O	A.I.
26		3.45	2.99	A.I.	+	A.I.
27		3.91	3.78	A.I.	+	A.I.
32		4.02	3.98	A.I.	+	A.I.
37		1.90	1.78	A.I.	+	A.I.

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